

# Adaptive Aeroservoelastic Suppression for Aircraft Upset and Damage Conditions, Phase I

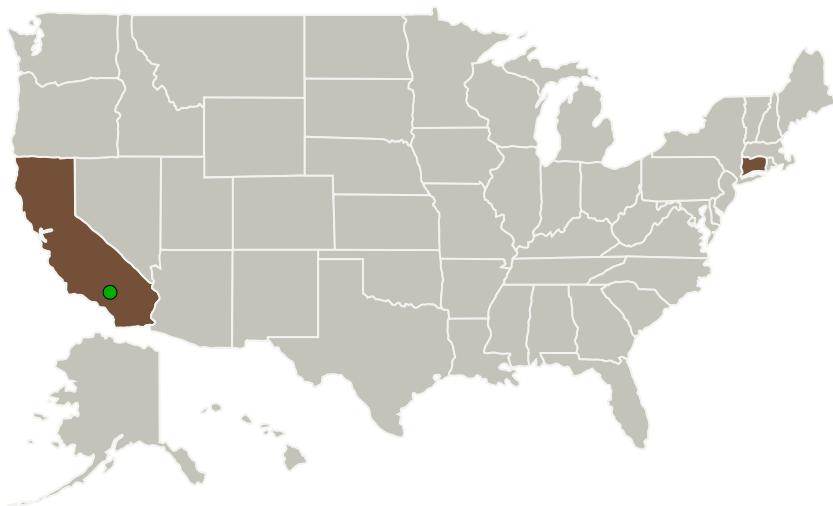
Completed Technology Project (2011 - 2011)



## Project Introduction

Impact Technologies, in collaboration with Tennessee State University, propose to develop and demonstrate an adaptive system identification and multi-loop control methodology that provides real-time aircraft structural mode suppression associated with aeroservoelastic interaction under upset and damage conditions. The proposed program will develop an effective real-time aircraft structural model, including rigid body dynamics and structural flexible modes, which will be used by the on-line, adaptive control system proposed. In parallel, the research team will also develop an innovative time/frequency domain system identification algorithm that can provide continuous updates to the real-time aircraft model and automatically assess the level of existing structural mode excitation. Next, a singular value decomposition technique will be implemented to capture and quantify the associated dominant parameter uncertainties of the dynamic aircraft model and adjust accordingly. Finally, a multi-loop adaptive control structure will be developed that provides both structure and robustness of the aircraft by using the continuously identified model with the overall goal of responding to the structural safety and performance needs including the effects of aeroservoelastic interaction and structural flexible mode changes. The proposed approach uses a generalized predictive control (GPC) scheme, which can be used to both update the real-time model and design a controller, for active aeroservoelastic suppression under upset conditions.

## Primary U.S. Work Locations and Key Partners



Adaptive Aeroservoelastic  
Suppression for Aircraft Upset  
and Damage Conditions, Phase I

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Organizations Performing Work	Role	Type	Location
Sikorsky Aircraft Corporation	Lead Organization	Industry	Stratford, Connecticut
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Connecticut

## Project Transitions

▶ **February 2011:** Project Start

✓ **September 2011:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137947>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Sikorsky Aircraft Corporation

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

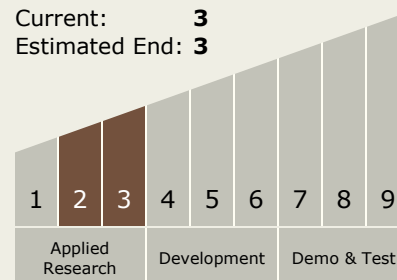
Carlos Torrez

## Principal Investigator:

Michael Roemer

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX10 Autonomous Systems
  - └ TX10.2 Reasoning and Acting
    - └ TX10.2.6 Fault Response

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System